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6. AUTHOR(S) James M. Dwyer, Mechanical Engineering Tech			
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## 13. ABSTRACT (Maximum 200 words)

Qualification tests were performed to determine whether the in-service CNU-405/E Shipping and Storage Container could be utilized to contain properly dunnaged solid type hazardous materials weighing up to a gross weight of 70.24 kg (155 pounds). The tests were conducted in accordance with Performance Oriented Packaging (POP) requirements specified by the United Nations Recommendations on the Transportation of Dangerous Goods and the Department of Transportation's Title 49 CFR and the Final Rulings published in the Federal Register, Vol. 55 on 21 Dec 90. The container has conformed to the POP performance requirements; i.e., the container successfully retained its contents throughout the specified tests.

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**PERFORMANCE ORIENTED PACKAGING TESTING  
OF  
CONTAINER, SHIPPING AND STORAGE, CNU-405/E  
FOR PACKING GROUP II SOLID HAZARDOUS MATERIALS**

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21 August 1991

**FINAL**

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## INTRODUCTION

The CNU-405/E Shipping and Storage Container tested, contained inert 25 mm cartridge weighing 63 kg (139 pounds), and an additional 7.2 kg (16 pounds) of lead. Overall weight of the container was 70 kg (155 pounds). This Performance Oriented Packaging (POP) test was performed to ascertain whether this standard container (Packing Group II) would meet the requirements as specified by the United Nations Recommendation on the Transportation of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9. A base level vibration test was also conducted in accordance with the final rulings specified in the Department of Transportation's Performance Oriented Packaging Standards in the Federal Register Volume 55. Due to unavailability, the number of containers used was less than the number required by the UN recommendation. This has been approved by the Under Secretary of Defense, Memorandum for the Joint Logistics Commanders dated 22 February 1990.

The objectives of these tests were to minimize the risk of personnel or environmental exposure to the hazards associated with the contents in the advent of a transportation or handling accident.

## TESTS PERFORMED

### 1. Base Level Vibration Test

This test was performed in accordance with paragraph 178.608 of the Performance Oriented Packaging Standards, Final Ruling, published in the Federal Register, Vol. 55, No. 246, December 21, 1990. One sample container was placed on the repetitive shock platform. The container was restrained during vibration in all but the vertical direction. The frequency of the platform was increased until the container left the platform 1/16 of an inch at some instant during each cycle. Test time was 1 hour at a frequency of 3.2 Hz.

### 2. Stacking Test

This test was performed in accordance with ST/SG/AC.10/1, chapter 9, paragraph 9.7.6. One container was used for this test. The container was subjected to a force applied to its top surface equivalent to the total weight of identical packages stacked to a height of 3 meters (including the test sample). A weight of 562 kg (1,240 pounds) was stacked on the sample container. The test was performed for 24 hours. After the allowed time, the weight was removed and the containers examined.

### **3. Drop Test**

This test was performed in accordance with ST/SG/AC.10/1, chapter 9, paragraph 9.7.3. One container was used throughout the test. Five drops were performed from a height of 1.2 meters (4 feet), impacting the following surfaces:

- a. Flat bottom
- b. Flat top
- c. Flat on long side
- d. Flat on short side
- e. One corner

All tests were performed at an ambient temperature of  $+70 \pm 20$  °F.

#### **PASS/FAIL (UN CRITERIA)**

##### **1. Base Level Vibration Test (HM-181 CRITERIA)**

The criteria for passing the base level vibration test is outlined in paragraph 178.608 of the Title 49 CFR Final Ruling and states the following: "immediately following the period of vibration, each package shall be removed from the platform, turned on its side and observed for any evidence of leakage. Rupture or leakage from any of the packages constitutes failure of the test."

##### **2. Stacking Test (UN CRITERIA)**

The criteria for passing the drop test is outlined in paragraph 9.7.6.3 of ST/SG/AC.10/1 and states the following: "...no test sample should leak. No test sample should show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages."

##### **3. Drop Test (UN CRITERIA)**

The criteria for passing the drop test is outlined in paragraph 9.7.3.5 of ST/SG/AC.10/1 and states the following: "Where a packaging for solids undergoes a drop test and its upper face strikes the target, the test sample passes the test if the entire contents are retained by an inner packaging or inner receptacle; e.g., a plastic bag, even if the closure is no longer sift-proof. A slight discharge from the closure(s) upon impact should not be considered to be a failure of the packaging provided that no further leakage occurs."

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## **TEST RESULTS**

### **1. Base Level Vibration Test**

Satisfactory.

### **2. Stacking Test**

Satisfactory.

### **3. Drop Test**

Satisfactory.

## **DISCUSSION**

### **1. Base Level Vibration Test**

Immediately after the vibration test was completed, each container was removed from the platform, turned on its side and observed for any evidence of leakage. There was no leakage to the containers as a result of this test.

### **2. Stacking Test**

Each container was visibly checked after the 24-hour period was over. There was no leakage, distortion, or deterioration to any of the containers as a result of this test.

### **3. Drop Test**

After each drop, the containers were inspected for any damage which would be a cause for rejection. Final inspection indicated damage was minimal with only minor denting noted. The containers remained intact and functional upon completion of the tests.

## **REFERENCE MATERIAL**

A. United Nation's "Recommendation on the Transportation of Dangerous Goods," ST/SG/AC.10/1, Revision 6

B. Title 49 CFR 107, et al., Performance Oriented Packaging Standard; Changes to Classification, Hazard Communication, Packaging and Handling Requirements Based on UN Standards and Agency Initiative; Final Rule, Federal Register, Vol. 55, No. 246 of December 21, 1990.

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# TEST DATA SHEET

<b>DATA SHEET:</b>	
Container: CNU-405/E Shipping and Storage Container	
Type: 4A2	Container P/N or NSN: 8140-01-201-8596
Specification Number: NAVAIRSYSCOM Drawing 986AS106	Material: Steel
Gross Weight: 70.24 kg (155 pounds)	Dimensions: 18.54" L x 10.51" W x 14.59" H
Closure (Method/Type): Removable Lid	Tare Weight: 10.17 kg (22.45 pounds)
Additional Description:  Also as part of test 16 pounds lead	
<b>PRODUCT:</b>	
Name: See table	NSN(s): See table
United Nations Number: See table	
United Nations Packing Group: II	
Physical State (Solid, Liquid, or Gas): Solid	
Vapor Pressure (Liquids Only): N/A      At 50 °C: N/A      At 55 °C: N/A	
Consistency/Viscosity: N/A	Density/Specific Gravity: N/A
Amount Per Container:	Flash Point: N/A
Net Weight: See table	
<b>TEST PRODUCT:</b>	
Name: 25 mm Cartridge	Physical State: Solid
Consistency: N/A	
Density/Specific Gravity: N/A	
Test Pressure (Liquids Only): N/A	
Amount Per Container: N/A	Net Weight: 52.85 kg (116.55 pounds)



TABLE 1  
 CNU-405/E Shipping and Storage Container

NALC	NSN	Type	Packing Drawing	UN Code	UN Number	#/ Cntr	Weight (lb)
A974	1305-01-209-5915	25 mm M791	5167214	1.4C	0339	55	44.7
A975	1305-01-212-8360	25 mm M792	5167214	1.2E (04)	0321	55	44.7
A976	1305-01-212-5066	25 mm M793	5167214	1.4C	0417	55	44.7
A978	1305-01-210-6802	25 mm PGU-23			0339	100	58.0
A978	1305-01-250-0101	25 mm PGU-23			0339	80	57.7
A979	1305-01-251-2582	25 mm PGU-20			0339	80	57.7
A980	1305-01-251-3023	25 mm PGU-20			0339	80	57.7
A981	1305-01-210-4811	25 mm M791	5167214		0321	55	44.7
A981	1305-01-271-7782	25 mm			0321		
A982	1305-01-199-6737	25 mm PGU-25			0321	100	58.0
A982	1305-01-250-0100	25 mm PGU-25			0321	80	
A982	1305-01-270-2318	25 mm			0321		
MM55	1375-01-327-9204	Det Mk 120	6705206-1	1.4B	0267	12	17.1
MM56	1375-01-327-9205	Det Mk 123	6705307-1	1.4B	0267	8	18.4
MM57	1375-01-327-9206	Det Mk 126	6705313-1	1.4B	0267	1	19.4
MM58	1375-01-328-5813	Det Mk 121	6705312-1	1.4B	0267	2	19.7
MM59	1375-01-328-4733	Det Mk 122	6705306-2	1.4B	0267	12	17.1
MM60	1375-01-328-4734	Det Mk 124	6705307-2	1.4B	0267	8	18.4
MM61	1375-01-328-4735	Det Mk 125	6705313-2	1.4B	0267	1	19.4
MM62	1375-01-328-4736	Det Mk 127	6705312-2	1.4B	0267	2	19.6

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**CNU-405/E**  
**SHIPPING AND STORAGE CONTAINER**  
**POP MARKING**

**UN 4A2/Y70/S/\*\*/USA/DOD/NAD**

**\*\* YEAR LAST PACKED OR MANUFACTURED**

**Encl (2)**